|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Lesson Plan Framework** | | | | | | | | | | |
| Teacher: Sherri Wade | | | | | | | | | | |
| Grade Level: 4th Grade | | | | | | | | | | |
| Course Unit: Physical Science | | | | | | | | | | |
| Lesson Title: Matter: Solids, Liquids, and Gases | | | | | Length of Lesson: 60 minutes | | | | | |
| **Focus Question/Big Idea/Learning Goals:** What do you want students to be able to know as a result of this lesson? What questions or big ideas drive the instruction? | | | | | **Learning Objectives:** What do you want students to be able to do as a result of this lesson? Include academic language and vocabulary objectives too. Objectives must be measureable. | | | | | |
| **Focus Question:** What are the three different states of matter?  **Big Idea:** I can identify the different stages of matter.  **Learning Goals:** Students will gain an understanding that all matter in the world can be classified as a solid, liquid, or gas. | | | | | Students will be able to classify materials as solids, liquids, and gases. Students will define the terms solids, liquids, and matter. Students will be able to show that when materials are manipulated they can take on different properties. Students will become familiar with writing a laboratory report. Students will work with different containers to measure the stages of matter. | | | | | |
| **STANDARDS:** Reference State (Social Studies and Science) Common Core (Math and ELA only) | | | | | | | | | | |
| Tennessee Standards:  Science  GLE.0407.9.2 Explore different types of physical changes in matter.  Checks for Understanding:  0407.9.1 Use appropriate tools to measure and compare the physical properties of various solids and liquids.  0407.9.2 Compare the causes and effects of various physical changes in matter.  SPI 0407.9.1 Choose an appropriate tool for measuring a specific physical property of matter.  SPI 0407.9.3 Interpret the causes and effects of a physical change in matter.  Embedded Inquiry:  GLE 0407.Inq.1 Explore different scientific phenomena by asking questions, making logical predictions, planning investigations, and recording data.  GLE 0407.7 Organize data into appropriate tables, graphs, drawings, or diagrams.  Checks for Understanding:  0407.Inq.3 Maintain a science notebook that includes observations, data, diagrams, and explanations.  SPI 0407.Inq.1 Select an investigation that could be used to answer a specific question. | | | | | | | | | | |
| Academic Language (discipline specific) – list terms | | | | | | Academic Vocabulary (lesson specific) | | | | |
| Processes  Guided Inquiry  5-E Lesson Plan Format (Engage, Explore, Explain, Evaluate, and Extend)  Experiment Tools  Laboratory Report  Assessment Scientific Discourse  Frayer Model Discuss  3,2,1 Summarize Predict  KWL Chart Observe  Alphaboxes Record  SWAT | | | | | | Liquid- flowing freely smooth and unconstrained in movement.  Gas- a substance, such as air, that will spread to fill any space that contains it. It move freely can expand.  Solid- substance that does not flow, it is hard or soft, not a liquid or a gas. It does not expand or move freely.  Matter- anything that has weight and takes up space as a solid, liquid, or gas.  Visible- can see  State- the way that something is, or the condition it is in.  Atom- a little particle.  Molecule- the smallest part of a substance that displays all the chemical properties of that substance. A molecule is made up of more than one atom. | | | | |
| **Pre-Assessment:** How will you determine prior knowledge? | **Hook:** How will you catch the attention of your students and focus their minds on today’s learning goals? | | | | | **Real World Connection:** How are learning goals relevant to students’ lives? | | | **Student Reflection:** How will you provide for student reflection? | |
| The teacher will ask questions about the three stages of matter to attain prior knowledge of the lesson. Through the answer of the students the teacher will be able to engage the complexity of lesson. | The teacher will display different stages of matter in a PowerPoint presentation and a book. | | | | | The students will gain the knowledge that everything around them is made-up of some type of matter. After the lesson, they will know that matter can go from one stage to the next if you add heat to it. | | | Students will reflect on the lesson of matter by filling out a journal and place in science learning log. Also, they will write down what they did not understand on a post-it and post on the “I have a question board”. Teacher will collect the questions at the end of the day and address those questions as part of the extension of the lesson. | |
| **ASSESSMENT** What evidence will you collect that students have mastered the learning objectives? | | | | | | | | | | |
| **Formative Assessment of Lesson Objectives**: How will you monitor and give feedback during the lesson? Be specific. | | | **Summative**: How will performance be measured? | | | | | | | |
| What evidence will you collect?  Check all that apply | | | | | How will you define mastery?  Attach relevant rubrics and grading criteria as needed. | | |
| The teacher will assess the students in the any/all of the following manners:   1. Collect students lab reports to determine whether students understand (a) solid, (b) liquid, and (c) gas. 2. Observe students doing the experiments. 3. KWL Chart, 3-2-1 Summarize, and Frayer Model. | | | * Project * Essay * Experiment * Short Answer * Presentation * Multiple Choice * Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | The students will be graded by the science laboratory report rubric provided.  Students will mastery 12- points to show mastery of the concepts. | | |
| **Assessment requires students to:** Check all that apply | | | | | | | | | | |
| Organize € Writing: € Draw Conclusions Connection to: € prior learning   * Interpret €Make Generalizations €life experiences * Analyze €Produce arguments * Synthesize * Evaluate information | | | | | | | | | | |
| **Academic Feedback**: How will you provide feedback to students based upon the data you collected in assessments? The teacher will provide feedback on each student’s lab report used during this lesson. If students haven’t achieved mastery of the lesson, the teacher will go over the lesson again through daily review, guided practice, and re-teaching the lesson to help the students. | | | | | | | | | | |
| **Learning Segments and Pacing:** What strategies, procedures, and transitions, will you use? What essential questions will you address in each segment? | | | | | | | How do learning segments align with objectives and allow for higher order thinking? What questions do you ask that promote higher order thinking? | | | **Materials** |
| Day 1 Whole Group Engagement  Teacher will introduce the different stages of matter using the Matter [Changing Paper](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS8.doc)demonstration**.**  The teacher will introduce the author, Kathleen Weidner Zoehfeld and Paul Meisel, and the book *What Is the World Made Of? All About Solids, Liquids, and Gases.* Discuss the different stages of matter in the book.  The teacher will read the story to the students the first time for enjoyment then reread the story so that students can listen for examples of solids, liquids, and gases.  After the second reading, students will complete the “Examples” and “Non-examples” sections on a Solids and Liquids[Frayer Model](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS12.doc)using items from the story.  After the demonstration of liquid to solid, students will complete the “Definition” and Characteristics” sections on a Solids and Liquids[Frayer Model](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS12.doc). Gas will be introduced the next day.  After the demonstration, teacher will pass out the butter and crackers as a snack. | | Time | | **Beginning** | | | What happens when teacher shook the glass jar?  What are you being asked to find?  How would you define matter?  What would happen if teacher continue to shake the glass jar?  Can you distinguish between the solid and liquid?  Can you name which substance is the solid and which substance is the liquid? | | | Book: What Is the World Made Of? All About Solids, Liquids, and Gases by Kathleen Weidner Zoehfeld and Paul Meisel  -Glass jar  -Several small plastic container  -Heavy Whipping Cream  -A pinch of salt  -Crackers  -Pencils  -Solids, Liquids, and Gases Frayer Model  -Matter Changing Paper |
|
| 55 mins. | |
|
|
|
| *Transition?* | | | | | | |  | | |  |
| Day 2 Whole Group Explanation  The teacher should go over basic safety procedures for the science investigations.  Review the Matter [Changing Paper](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS8.doc) demonstration, discussing the changes that were observed.  The teacher will explain that the changes that occur are different from the one we are going to do today.  To demonstrate that the mixing of a solid and a liquid create a chemical change and cause bubbles (gas), the teacher will demonstrates the [Balloon Blow-Up](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS6.doc). Then have the students do the experiment too.  The teacher will divide the students into a group of four.  The teacher will hand-out the materials for the experiment.  The students will pour about an inch of liquid--half vinegar, half water--into the bottle. Use a funnel to fill the balloon half full of baking soda.  The students will stretch the open end of the balloon over the neck of the bottle. Making sure the balloon is on the bottle tight. The heavy end of the balloon dangle, so no baking soda goes in the bottle.  At this point, reinforce the concept of chemical reaction. Ask students for predictions, or ideas of what will happen when the reaction occurs.  Students need to hold onto to the balloon at the bottle neck, and pick up the heavy part of the balloon so that all the baking soda falls into the vinegar at the bottom of the bottle.  Students should notice that sound is being produced. They may question if bubbles were created as a result of the chemical reaction. The teacher should explain that thousands of bubbles are now trapped in the balloon.  The teacher will ask the students to record their observation in the “Results” section of their laboratory report  The student:  Explain that a chemical reaction occurred between the baking soda (solid), the vinegar (liquid), and the water creating carbon dioxide. | | Time | | **Middle** | | | Discuss what happened to the balloon.  What caused the balloon to rise?  Was there a physical or chemical change?  What two reactants came together?  After the change, was there a new substance?  Ask students, What changes do you see? (bubbles, sound, gas) What clues do you look for when solid and liquid mixed?  Was a new substance created? (Bubbles)  Ask students if they can think of any similar substances in their own life. Lead students to idea of the soda they drink.  What prior information supports your conclusions about the bubbles? | | | -Baking soda  -White vinegar  -Matter Changing paper  -20 oz empty water bottles  -Small balloons  -Pencils  -Laboratory Reports  -Funnel/straw |
| 45 mins. | |
|
|
|
| *Transition?* | | | | | | |  | | |  |
| How will you close the lesson?  Students will use [3-2-1 Summarize](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS2.doc) as a daily debrief. The student will summarize the lesson and place the summary in their science learning log. | | Time | | **End** | | | What is a solid?  What is a liquid?  What is a gas?  What are some characteristics that can help you determine the different stages of matter?  What was the hardest part of the experiment? | | | -Pencils  -3-2-1 Summarize sheet |
| 15 mins. | |
|
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| --- | --- |
| **Technology Integration** | **Teacher Strategies – Best Practices** |
| Highlight desired bullets; check all that apply   * Word Processing * Power Point * Internet Resources * Graphics/Charts * Internet Research * Web 2.0 Tool(s) * Interactive whiteboard   Other: | Highlight desired bullets; check all that apply   * Student choice * Modeling * Cooperative learning * Independent learning * Implementing pre, post, and during lesson activities * Teaching metacognitive strategies * Hands-on learning/manipulative utilized * Higher-ordering thinking skills * Real-world connections * Criteria charts created (student-driven; supports learning by defining and clarifying a task ) * Rubrics created (student-centered) * Mentor texts * Anchor charts (a reference tool that “anchors” new and ongoing learning to key concepts previously introduced) * Research/research materials * Evidence of assessment for learning (teacher modifies instruction based on students’ understanding) * Academic language used in context * Conferencing * Other (please explain) |
| **Grouping Options:** How will your groups be organized? What roles will students fulfill? Check all that apply. | **Differentiation:** How will you differentiate instruction to accommodate individual students’ anticipated learning difficulties, interests, and/or cultural heritage? |
| * Individual * Pairs * Cooperative * Whole Group | Teacher can determine background knowledge informally through the use of a KWL chart. Teacher can provide direct instruction to students having difficulty distinguishing differences between solid, liquid, and gas. The 3-2-1 Summarize responses can be used to guide individual instruction. Groups will be created by the teacher taking into consideration student learning styles, personalities, work habits, background knowledge, and ability levels. Each group member must take on a specific role. For example, a student who is a strong writer might take notes for the group, while a student who enjoys public speaking might present the group’s findings. Each student will be responsible for the success of the group. All students will be expected to complete all investigations successfully. Peer assistance should be encouraged within the group. The teacher will act as a facilitator and offer direct instruction or additional time if needed. |
| **Intervention:** How will you use the results of the assessment(s) to inform future instruction? | **Special Situations in the Classroom?** Are there any management and/or safety issues that need to be considered? |
| Reflection questions for teacher:  How was inquiry experience received by my students?  Were the objectives clearly addressed?  Did I encouraging my children to listen and respond to the remarks of their peers, take risks, and ask critical questions in both large and small groups?  To what extent did my questioning foster critical and creative thinking?  Did I provide sufficient opportunity and time for the children to work independently, in pairs and in small groups?  Were my assessment techniques fair and appropriate for evaluating progress and understanding?  Did the inquiry lessons fit within the time allotment you had planned?  How did you feel throughout the inquiry experience?  Would you use this inquiry lesson again? If so what would you do differently? | The teacher needs to make sure that students do not pour the vinegar into the baking soda. The reverse order can cause a un-need reaction. The teacher needs to address food allergies. |
| **Rationale/Theoretical Reasoning:** What sources support your pedagogy and methodology? Why have you chosen the strategies you have elected to use? | |
| Misconception of matter:  There are four states of matter. The fourth stage is called plasma. If you apply extreme heat to the gas stage, you will reach the plasma stage. The Sun is the plasma stage. A common misconception is blood plasma is the fourth stage of matter. Another misconception is that all solids have to be rigid and hard. Pourable solids are view as liquids and not solids. When water boils and bubbles, the bubbles are air, oxygen or hydrogen, or heat. It is not, the bubbles formed by boiling water consist of water vapor (steam). When steam (gas) is no longer visible it becomes air. When in fact water vapor (gas) condenses in the air it is visible as tiny water droplets. Water (liquid) in an open container is absorbed by the container, disappears, changes into air, or dries up and goes into the air. Water in an open container evaporates, changing from a liquid to a gas.  Misconceptions of Matter  <http://planetarium.statemuseumpa.org/documents/ibex-educators-guide-four-states-matter.pdf>  Gardner’s Theory of Multiple Intelligences:  Linguistic intelligence: Students will communicate with each other by using spoken and written language.  Bodily-kinesthetic intelligence: Students will hands to mix the baking soda and vinegar to solve problems of the experiment.  Interpersonal intelligence: Students will work together to complete the experiment.  Intrapersonal intelligence: Students will work individually to complete the laboratory report.  Gardner, H. (2000), *Intelligence reframed: Multiple intelligences for the 21st century*. New York:  Basic Books  Piaget’s Cognitive Development Theory:  Through Piaget’s theory of Cognitive Development, students will develop the growth of knowledge by solving concrete problems in a logical fashion by understanding that the three stages of matter. Students understand that the solid can change from a liquid to a gas and is reversibility.  Vygotsky's Society Development Theory:  Through Vygotsky’s theory of Cognitive Development, students will master the concept of states of matter by modeling the teacher and peers. By the zone of proximal development, students will receive the appropriate help and support to do the balloon blow-up experiment.  Vygotsky, L.S. (1978). Mind and society: The development of higher mental processes. Cambridge, MA: Harvard University Press. | |

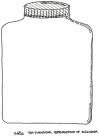
References:

<http://www.amazon.com/Solids-Liquids-Lets-Read-Find-Out-Science/dp/0064451631>.

<http://planetarium.statemuseumpa.org/documents/ibex-educators-guide-four-states-matter.pdf>

Robin, A. (2012). “I Can’t Believe It’s Butter! A Kindergarten Science Project”. Retrieved on Mar. 2, 2013 from [www.superteacherideas.com/**science**7-matter.html](http://www.superteacherideas.com/science7-matter.html).

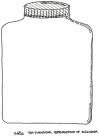
Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Frayer Model Solid Change

|  |  |
| --- | --- |
| Definition  Chemical Change | Characteristics |
| Examples | Nonexamples |

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



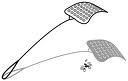
Frayer Model Liquid Change

|  |  |
| --- | --- |
| Definition  Chemical Change | Characteristics |
| Examples | Nonexamples |

KWL Chart

States of Matter

|  |  |  |
| --- | --- | --- |
| **What I KNOW** | **What I WANT to Know** | **What I LEARNED** |
|  |  |  |

**SWAT!**

**Fun with Vocabulary for the states of matter**

**This vocabulary review activity requires two fly swatters and a strong, flat surface on which to display the words. The teacher will write or post the words on the board, and divide the class into two teams. The students number off and the #1 student from each team comes to the board, picks up a fly swatter and stands with his/her back to the words.**

**The teacher reads a definition, says, “Go!” and the students turn and quickly try to SWAT the correct word. If both students choose the same word, the fly swatter that is on the bottom gets the point.**

**The kinesthetic learners in the classroom will love this activity. It encourages students to pay close attention to the words and the definitions because they may be read over again during the game.**

 3-2-1 Summarize

States of Matter

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| 3 | Things I Learned Today … |
| 2 | Things I Found Interesting … |
| 1 | Question I Still Have … |

Student Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Assessment Rubric

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Needs  Improvement | Satisfactory  Understanding | Good  Understanding | Through  Understanding |
| **Communication of Scientific Findings** | No explanation, or the explanation could not be understood, or was unrelated to the task or investigation  No prediction made for investigation  No observation or findings recorded | An incomplete explanation or explanation not clearly presented  Predictions not based on prior information  Incomplete observations recorded | A clear explanation was presented  Effectively used scientific representations to organize and display information  Appropriately used data | Provided clear, effective explanations of observations of task  Interpretation of observations supported conclusions and raised new questions for group discussion  Explained or defended prediction |
| **Scientific Content** | No use, or inappropriate use of scientific terminology  No mention, or inappropriate references to scientific concepts  Some evidence of understanding characteristics and properties of physical/chemical change | Used some relevant scientific terminology  Minimal reference to relevant scientific concepts  Evidence of understanding observable characteristics of physical/chemical change | Appropriately used scientific terminology  Provided evidence of understanding of relevant scientific concepts  Evidence of understanding observable characteristics of physical/chemical change | Precisely and appropriately used scientific terminology  Provided evidence of a deep understanding of scientific concepts  Understands characteristics of physical/chemical change and can make connections or extend thinking |
| **Collaboration** | Works only when prompted  Needs occasional reminders to be sensitive to the feelings of others | Works toward group goals with occasional prompting  Shows sensitivity to the feelings of others | Works toward group goals without prompting  Shows sensitivity to the feelings of others | Consistently and actively works toward group goals  Values the knowledge, opinion and skills of all group members  Willingly accepts and fulfills individual role(s) within the group |
| **Language Skills/Writing** | Ideas not ordered  Incomplete sentences with fragments and run-ons  Many errors in subject verb agreement and tense  Many spelling errors  Many punctuations errors  Handwriting hard to read | Main idea given  Complete sentences; few run-on sentences  Some errors in agreement and tense  Some spelling errors  Few punctuations errors  Mostly legible | Orderly arrangement of ideas and details  Complete sentences  Few errors in grammar  Few spelling errors  Minor errors in punctuations  Neat handwriting | Interesting and well organized ideas and supporting details  Sentence types relate to task  No errors in grammar  No spelling errors  Correct punctuation throughout entries  Neat, easy to read, well formed |

**Laboratory Report**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Laboratory Report: Many scientists use laboratory reports to organize experiments.

Directions: You will write your own laboratory report when you create the balloon blow-up experiment. Complete each section below when your teacher instructs you to do so.

1. Purpose: Write on sentence about what you are going to do in this experiment.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Materials: List all materials that were used in the balloon blow-up experiment.
2. Experiment: Complete the remaining steps that were taken to do the balloon blow-up experiment.

Step 1: Each student put how much \_\_\_\_\_\_\_\_\_\_\_ baking soda into the balloon.

Step 2. Each student put how much of the vinegar \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Step 3: Use a \_\_\_\_\_\_\_\_\_\_\_\_ to fill the balloon half full of baking soda.

Step 4. Stretch the open end of the balloon over the neck of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Step 5. Make sure it's on tight!

Step 6. Let the heavy end of the balloon \_\_\_\_\_\_\_\_\_\_\_, so \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ goes in the bottle.

Step 7. What would happen if you pour the baking soda in the bottle? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Step 8 Hold onto to the balloon at the bottle neck, and pick up the \_\_\_\_\_\_\_\_\_\_\_\_\_of the balloon so that all the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (solid) falls into the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (liquid) at the bottom of the bottle.

Step 9: What do you think will happen how?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Record Your Results on the “Results” section of the Laboratory Report worksheet.

1. Results: Answer the following questions:

What did you observe from the balloon?

Can you distinguish between the solid and liquid after mixing the two materials?

How would you identify the presents of a gas?

What was the hardest part of the experiment \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?

1. Discussion and Conclusions: Answer the following questions:

What data was used to make your conclusion?

What happen to the baking soda and vinegar?

What are the bubbles made of?

Did you enjoy making do the balloon blow-up experiment?